



INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS (IGPP) LOS ALAMOS NATIONAL LABORATORY (LANL)

FY07 Call for Research Proposals
(Both New and Renewal Proposals)

Deadline for receipt: March 31, 2006

1. INTRODUCTION

The Institute of Geophysics and Planetary Physics (IGPP) at Los Alamos National Laboratory (LANL) is a branch of the University of California's Systemwide Institute of Geophysics and Planetary Physics. Its mission is to promote and coordinate basic research on the understanding of the origin, structure, and evolution of the Earth, the Solar System, and the Universe, and to develop the science base to predict future changes as they affect human life. As part of the mission, IGPP at LANL is committed to promoting and supporting high quality, cutting edge science in the areas of astrophysics and cosmology; space physics; solid earth geoscience; and complex dynamical climate systems. These focus areas are selected based on their breadth of scientific challenges facing the international scientific community as well as on the strategic need to extend scientific excellence supporting LANL mission. IGPP/LANL makes a special effort to promote and support new research ideas, which can be further developed through seed funding into major programs supported by federal or other funding sources. Collaboration between LANL scientists, university scientists, (LANL or University) postdocs, and (LANL/University) graduate students is viewed by IGPP as an effective arrangement to promote creativity and extend science beyond today's understanding.

The Director of the Los Alamos National Laboratory provides funds for collaborative research involving LANL postdocs and LANL collaborations with University principal investigators (PIs), i.e., in the form of a minigrant program. This financial support has historically been augmented by a small contribution from the Regents of the University of California, to support collaborative projects involving University of California PI's, postdocs, and/or graduate students. Graduate student and/or postdoc participation is an essential component of all approved minigrant projects. While many minigrants extend up to three years duration, IGPP issues minigrant awards on a one-year basis with renewals decided as per scientific progress. In most cases, minigrants are dedicated to support salary and travel costs for the participating graduate student and/or postdoc, some equipment costs, and a minimal amount of support for the PIs.

NEW FOR FY07. Starting in FY07, IGPP will support two types of minigrants. The first type is the same as was supported in previous years, i.e., collaborative minigrant projects between a LANL co-PI and a University co-PI, where a University postdoc and/or graduate student is the centerpiece. The second type of minigrant, i.e., new in FY07, will provide up to 50% support to LANL programmatic postdocs.

- More details on the first type: University/Laboratory collaborative research. Each proposal is required to have a University PI and a Laboratory PI. A University PI is any University scientist entitled by the University to be Principal Investigator on an extra-mural grant. A Laboratory PI is any Technical Staff Member (TSM). Visiting scientists, adjunct faculty and postdocs do not qualify as co-PI unless an exception is granted by the University. Successful proposals of this type are **required** to include some form of matching support from their universities. Acceptable forms of matching support are the same as, but not restricted to, those accepted by the National Science Foundation or other Federal research funding agencies.

Proposals may be submitted from any US university. On average, 60% of all approved IGPP minigrants awarded at Los Alamos originate from non-UC campuses. Typical grants are \$25K-\$45K, per annum, and approximately 25-35 grants are issued each year.

- More details on the second type: partial support to LANL programmatic postdocs. Each proposal is required to have already secured programmatic support of at least 50% of the postdoc salary. Proposals will be for one year only, though renewal proposals for an additional year will be considered. Postdocs entering their first, second, or third year will be considered for support. Proposals must be submitted by a LANL PI, and it is expected that the named postdoc provides significant contributions to the writing of the proposal. For this type of minigrant, there is no requirement for University collaboration.

This FY07 call is for both collaborative research proposals and LANL postdoc proposals. All proposals must respond to the scope of science outlined in the focus areas specified in Section 2 of this announcement.

2. SCIENTIFIC DISCIPLINES INCLUDED IN THIS CALL

IGPP has four focus research areas, included in this call for proposals:

- Astrophysics (Focus Leader: Richard Epstein epstein@lanl.gov)
- Space Physics (Focus Leader: Reiner Friedel friedel@lanl.gov)
- Solid Earth Geoscience (Focus Leader: Claudia Lewis clewis@lanl.gov)
- Complex Dynamical Climate and Environmental Systems (Focus Leader: Manvendra Dubey dubey@lanl.gov)

Each of these focus areas is directed by a focus leader (identified in parentheses) who is responsible for coordinating research efforts so that individual projects will benefit from the best available resources and expertise. Prospective grantees are encouraged to contact the respective focus leaders for information on technical scope of the focus area and/or visit the IGPP website

<http://www.igpp.lanl.gov/> for additional information and answers to frequently asked questions.

The IGPP director and focus leaders have identified the following topics of interest, per focus area, as guidance for proposal preparation.

Astrophysics

Proposals are solicited with emphasis on theoretical research, observational research, and instrumentation research. General interests are multidisciplinary projects at the boundaries between astrophysics and nuclear physics, particle physics, condensed matter physics, plasma physics, and/or general relativity. Use of LANL facilities is highly desirable, e.g., exploitation of the Milagro gamma-ray observatory.

The following specific topics are of interest:

- gamma ray astrophysics
- space instrumentation
- stellar dynamics
- neutron star and black hole physics
- physics of accretion disks
- cosmology and galaxy formation
- cosmic microwave background
- supernovae

Space Physics

NOTE: For FY07, only minigrants of the second type – partial support to LANL programmatic postdocs – will be considered (see explanation below)

Proposals are solicited that advance theoretical research, computational research, and/or observational research into the plasma environment of the Earth's atmosphere and into processes that affect this environment. Research on the transport of plasma and energy from the Sun through interplanetary space to the Earth is also encouraged. These include the interaction of various plasma populations and the coupling of microscopic and macroscopic phenomena. The following specific topics are of interest:

- global structure of the solar wind in the Heliosphere
- kinetic fine structure of the solar wind
- magnetohydrodynamics of the magnetosphere
 - magnetospheric storms and substorms
 - magnetotail current sheet dynamics
- magnetospheric models (near-Earth plasma sheet and the inner magnetosphere) and their use of LANL data for either boundary conditions, assimilation or validation
- model/data assimilation methods and application to space physics models
- physics affecting the performance and reliability of space-borne and ground-based technological systems
 - statistics and predictability of magnetospheric storms and substorms
 - physics governing satellite to ground communications
- solar wind interaction with planetary magnetosphere (“planetary space physics”) such as Jupiter or Saturn
- remote sensing of planetary geology and climate by planetary orbiters
- laboratory and theoretical research leading to new space based instrumentation
 - mass spectrometer designs (1 eV up to 10s of MeV)
 - detectors (electron multiplier, solid state, etc.) and detection technologies that can operate in high radiation background environments
 - higher capability onboard processing techniques and technologies in both hardware and software
 - high sensitivity neutral atom detection/imaging technologies (1 keV-10s of keV)

Leveraging against LANL facilities and databases, e.g., linkage to multi-cluster satellite experiments or computer simulation codes, is strongly encouraged.

IMPORTANT: Please note that with the large number of renewal minigrant proposals (of the first type) anticipated in FY07, we will not be supporting any new starts for University/Laboratory collaborative research in FY07. On the other hand, we will be supporting new projects starting in FY07 that provide partial support to LANL programmatic postdocs.

Solid Earth Geoscience

This focus supports a breadth of basic research concerning planetary surfaces and interiors, including numerical, experimental, and field studies of the structure, properties, processes, and dynamics of the Earth. It is strongly recommended that proposals exploit unique LANL resources, such as high-performance computing resources, the Los Alamos Neutron Science Center (LANSCE), or other unique laboratory facilities.

For FY07, we are particularly interested in innovative research projects in areas of current, strong international scientific interest such as the following:

- New techniques in passive (imaging) or active (e.g., lidar, radar) remote sensing and digital data analysis for the geosciences
- Earthquake seismology and seismotectonics, including rupture processes, rheology and friction of fault zones, and earthquake clustering
- Earth materials: dynamics, elasticity, strain localization, low temperature thermal evolution, effects of ionizing radiation
- Transient and steady-state behavior in geologic and hydrologic processes, including multi-phase fluid flow in porous and fractured media
- Dynamic interactions among climate, tectonics, and surface processes, including mechanics of erosion

The following areas reflect continuing IGPP interest –

- Earth's interior-composition and state, and rheology of crust, lithosphere, and mantle
- Geomagnetism and electromagnetics
- Dynamics of lithosphere and mantle
- Tectonics
- Tomography
- Heat generation and transport

Complex Dynamical Climate and Environmental Systems

This focus area emphasizes the nonlinear dynamics and multi-equilibria of the coupled atmosphere, (liquid and ice covered) ocean, hydrosphere, and biosphere of planet Earth, on scales ranging from urban canopies to basin and global extent. General interests are studies that extend our understanding of the causes of temporal variations of ocean and atmospheric basin scale oscillations; rapid climate change on both global and regional scales; climate forcings by greenhouse gases and aerosols, and the physics and chemistry governing multiscale interactions extending from the urban canopy to basin scales. Use of LANL facilities and data bases (e.g., use of LANL's GIS facilities, and/or data bases of the ARM program, and from remote sensing platforms) are strongly encouraged.

Specific topics of interest in FY07 include the following:

- dynamics governing abrupt changes in the atmosphere-ocean system
- high-resolution coastal ocean and sea ice modeling
- physics and biogeochemistry governing formation, transformation, deposition, and spatial heterogeneity of atmospheric aerosols, including the role of clouds
- pollution in megacities, including the role of energy related emissions and new technologies in abatement strategies
- nonlinear dynamics of moving cyclones and hurricanes
- physics governing air-sea interactions
- high-resolution modeling of lightning and rainfall, in complex terrain
- physics, chemistry, and surface processes governing forest fires in complex terrain
- physics and stochastic characterization of Large Eddy Simulations (LES) of chemical and biological transport in urban canopies and other regions of strong heterogeneity
- inverse nested modeling, including DNS, LES, and forward modeling, in complex terrain
- statistical and model-based interpretation of paleoclimatic data
- observations and process modeling of components of the carbon cycle, from the local to global scale

SPECIAL LARGE PROJECT COMPETITION

In addition to the above projects, IGPP is soliciting proposals for a single project in one of the focus areas for up to \$100K for particularly innovative research. Examples of such needs are:

- Concentration of effort on a specific topic that needs rapid advance
- A multi-campus/laboratory project
- An important project requiring salary for Laboratory PI
- A project requiring specific funds for laboratory apparatus, field trips, etc.

The intent is for IGPP to support a single project whose results would be of considerable interest to the community at large and to the Laboratory, and could only be completed with a higher level of financial support. The project would be supported for up to three years (assuming adequate yearly progress and available IGPP funding). Interested investigators should directly contact the IGPP Director for additional information and assistance.

3. FUNDING INTERVAL AND IN-KIND CONTRIBUTIONS FOR MINIGRANTS INVOLVING UNIVERSITY/LABORATORY COLLABORATIVE RESEARCH

The funding interval is October 1, 2006, through September 30, 2007. PIs should note, however, that the availability of funds is contingent upon the date the contract is awarded by the LANL Contracts Office, which may be up to several months after the start of the fiscal year for new proposals. For all minigrant projects supported with LANL financial resources, it is imperative (with no exceptions) that the LANL-originated funds are spent by COB September 30, 2007.

The University of California (UC) waives overhead for this program. Non-UC institutions are encouraged to do the same; if this is not possible, some alternate in-kind contribution is expected. In many cases, proposals may be submitted as multi-year efforts, usually with a maximum of three years. Renewals for the second or third year are determined based on progress during the previous year and timely delivery of progress reports.

4. FUNDING INTERVAL FOR MINIGRANTS THAT SUPPORT LANL POSTDOCS

The funding interval may be up to 12 months, with work performed entirely within FY07. Renewal proposals will be required for scientific activity which extends into FY08. The LANL PI will be required to include in the proposal details on all other funding sources that will be required to cover postdoc salary costs during the fiscal year.

Because LANL LDRD funds are used to support LANL postdocs under this IGPP minigrant program, the PI and postdoc will be required to spend the LDRD funds by COB September 30, 2007; there are no possibilities to carryover LDRD funds into the next fiscal year.

5. GUIDANCE: PREPARATION OF NEW PROPOSALS

The following format is recommended for all proposals:

Cover Sheet, to include on one page:

- Title of proposed project
- Name of University Campus if the minigrant is for University/Laboratory collaborative research, or name of Group and Division if proposed project supports a LANL postdoc
- Is this a new proposal or renewal? If you are submitting a proposal for renewal, please indicate if the proposal is a second year renewal or third year renewal.
- Which IGPP focus area(s) is this proposal most relevant to?

- Astrophysics
- Space Physics
- Solid Earth Geosciences
- Complex Dynamical Climate and Environmental Systems
- Proposed start date, and proposed duration of project (usually 1, 2, or 3 years).
- Name, title, address, email address, and phone number for PIs.
- Name and email of postdoc and/or graduate student(s), if known.

Main Body (including budget information)

Use the following outline in formatting the main body; please limit to **five total pages** of text (for Sections I through IX), plus figures and a budget page:

- I. Title of project, and short abstract
- II. Principal investigators and team, including all contact information
 - i. University PI (if relevant): address, telephone number, fax, and email address
 - ii. LANL PI: Group, telephone number, fax and email address
 - iii. Name and email address of participating postdoc and/or graduate student(s)
- III. Start date, and project duration
- IV. Objectives
- V. Background
 - i. History of problem
 - ii. Scientific debate
 - iii. Hypotheses to test
 - iv. Why now?
- VI. Approach
 - i. Theoretical, numerical, or experimental activity
 - ii. Methods used (describe comprehensively)
 - iii. Any relevant leveraging or necessary coordination, e.g., other projects or facilities
- VII. Resources to be used in the project
 - i. Resources at Los Alamos
 - ii. Resources at the University
 - iii. Other Resources
- VIII. Statement of Work
 - i. Tasks to be performed
 - ii. Milestones
 - iii. Deliverables
 - iv. For collaborative proposals: schedule of visits (and work performed) at LANL or Campus
 - v. For LANL postdoc proposals: schedule of any visits to other institutions, in particular for work to be performed outside of the Laboratory
- IX. References
- X. Proposing Team
 - i. Role of University PI (if relevant)
 - ii. Role of Laboratory PI, including efforts at mentoring
 - iii. Role of postdoc or graduate student
 - a. Identify if MSc or PhD project, if grad student
 - iv. Other participants
- XI. Significance and timeliness
 - i. What is the significance of the project? One way of getting at this is to answer the question, “When this project is finished and published, who will use the results?”

This question should be dealt with explicitly, with significant input from the Laboratory PI.

- ii. Why should this project be funded now instead of, e.g., next year?
- XII. Budget summary
 - i. Indicate separately those amounts to be spent on campus(es) and at LANL:
 - a. Salaries. Details of computations to be provided.
 - b. Supplies
 - c. Computer usage and related costs
 - d. Travel
 - e. Equipment
 - f. Other expenses
 - g. TOTALS: for campus, for laboratory
 - ii. Supplemental budget information (including a section on current and pending support for research from other sources)
- XIII. Biographical sketches of PIs including already identified postdocs and/or graduate students, ~1 page each.

While IGPP supports publication page charges, such charges are NOT to be included in the proposed budget. PI's are asked to send an email to the IGPP director at which time funding is needed to cover page charges for publications associated with IGPP research.

6. GUIDANCE: PREPARATION OF RENEWAL PROPOSALS

Proposals submitted for renewal must contain the following information:

1. Cover Sheet, to include the same information as for a new proposal
2. Copy of original proposal
3. Progress report
 - a. If this is a first time renewal (from year one to year two), only a brief statement of progress during the first year of work will be needed (max one page); see below.
 - b. If this is a second time renewal (from year two to year three), a much more extensive progress report of order 5 pages is required; see below.
4. Revised work plan for FY07
5. Updated declaration of other ongoing research projects related to the IGPP funded project
6. Detailed budget request, noting any changes from the original proposal.

The statement of progress for first time renewal proposals (year 1 to year 2) should include a summary of activity that took place during FY06: scientific activity; presentations and publications; visits and exchanges of personnel between the University and Laboratory; etc.

For additional information on report guidelines you can go to the [IGPP Progress Report Guidance](#).

For renewal proposals (only for proposals that go into the third year of work), the requirement is for a formal progress report to be included that follows the following format (approx 5 pages total):

- Project objectives and brief summary of work plan (maximum half page)
- Summary of research results to-date (1-3 pages), plus any relevant graphics
- Any new insights or challenges in meeting project objectives
- Any complications in meeting project objectives
- List of publications, including submissions
- List of Presentations
- Name of grad student and/or postdoc
- Progress towards PhD, if graduate student

- Documentation of visits to LANL and/or to University, or other facilities/sites
- LANL and/or facilities used in the research
- Budget details
- Efforts to secure further funding from other agencies.

For additional information on report guidelines you can go to the [IGPP Progress Report Guidance](#).

7. FINAL REPORT AFTER COMPLETION OF PROJECT

At the completion of each project, whether it be one, two, or three years duration, a final report must be submitted. Projects that are completed at the end of FY07 must submit their final report by close of business, October 7, 2006. The format for the final report must be:

- Project objectives and brief summary of work plan (maximum half page)
- Summary of research results to-date (1-3 pages), plus any relevant graphics
- Any new insights or challenges in meeting project objectives
- List of submitted and already published manuscripts, including a very brief (max one paragraph) description of the key results of each publication.
- List of Presentations
- List of patents and awards
- Name of grad student and/or postdoc
- Progress towards PhD, if graduate student
- Documentation of visits to LANL and/or to University, or other facilities/sites
- Discoveries that have led to new research challenges, based on the research
- Efforts to secure further funding from other agencies.

For additional information on report guidelines you can go to the [IGPP Progress Report Guidance](#).

8. PROCESS OF REVIEWING, SELECTING OR REJECTING PROPOSALS

All new proposals undergo peer review by scientists in the broad research community who are familiar with the research topic. Reviewers are given a set of questions to address, i.e., concerning scientific merit, risks in reaching objectives, depth of multi-institutional collaborations, growth potential of research topic, quality of participants, and budget.

With only unusual exceptions, renewal proposals are reviewed by the IGPP Director and focus leaders, and input is also solicited from relevant members of IGPP's External Advisory Committee. Renewal proposals going into their second year of work are generally approved, i.e., unless there are indications from the LANL PI or Focus Leader that collaborations are ineffective. Renewal proposals going into the third year are evaluated not only on the written proposal but also on an oral presentation by the LANL PI to the IGPP management team (to be conducted in May 2006). Effective contributions by the University PI / LANL postdoc to these presentations will greatly enhance the likelihood of renewal.

Final decisions on acceptance and/or denial of all proposals will be reached during the annual meeting of IGPP's External Advisory Committee, typically in June of each year. Formal announcements of acceptance / denial of proposals will be made no later than August 1, 2006.

In preparing proposals, PIs should be aware of the following reasons why some proposals are rejected:

- Objectives and background are unclear or inadequately argued.
- Methods are inadequately described or do not reflect state-of-the-art.

- Approach is not convincing enough to satisfy the objectives.
- For research proposals involving University/Laboratory collaborations, collaborations are weak.
- Important and relevant LANL facilities are not considered or exploited.
- No graduate student or postdoc is involved in the research.
- Lack of commitment by the Laboratory PI to the research or mentoring process.
- Subject matter is not relevant to IGPP's scientific interests or research priorities.

9. SECURITY CONSIDERATIONS

Classified work is not supported under the IGPP minigrant program. Therefore, all research facilities (including office space and computing) conducted under IGPP funding will be carried out in unclassified space.

10. POLICY REGARDING PREJUDICE AND BIAS

While minigrant applications must originate from US institutions, there is no prejudice based on race, gender, or nationality, for PI's, postdocs, and students.

11. MAILING INSTRUCTIONS AND DEADLINE

Proposals (title, abstract page, main body including budget) must be submitted by email from the email account of either the LANL or University PI, to be received by IGPP no later than **March 31, 2006**.

Send to: Ms. Debra S. Saiz (dsaiz@lanl.gov)
with copy to: Gerald Geernaert (geernaert@lanl.gov).

Proposals may also be submitted in hard copy, with a disk, to the IGPP Center Director, to be received **by close of business, March 31, 2006**.

IGPP Center
Los Alamos National Laboratory
P.O. Box 1663 MS C305
Los Alamos, NM 87545

Federal Express Address:
IGPP Center
Los Alamos National Laboratory
Warehouse SM 30 – MS C305
Bikini Atoll Road
Los Alamos, NM 87545

Mandatory for proposals involving the University of California: Please send an information copy by either email or surface mail to:

Gary P. Zank
Systemwide Director, Institute of Geophysics and Planetary Physics
Professor of Physics
University of California
Riverside, CA 92521
Tel: (951) 827-4508

Email: gary.zank@ucr.edu

12. REQUIREMENT FOR SIGNATURE PAGES

Signature pages are no longer required at the time proposals are submitted. IGPP will request signatures from the co-PI's, and their respective institutional officials, i.e., if and only if IGPP recommends the proposal for funding. Before initiation of a PR for funds transfer to campuses, signatures will be required from the University Department Chair or Director of campus-organized research unit, Management Service Officer or Fiscal/Budget Person, and Contract and Grants Officer; for LANL, the Proposing Laboratory PIs must receive approvals from their respective Group Leaders.

13. FOR FURTHER INFORMATION:

IGPP Office
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1-505-667-0920

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